Electropneumatic Positioner
Type 3730-1



Fig. 1 · Type 3730-1

Mounting and Operating Instructions

EB 8384-1 EN

Firmware version 2.0x

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Contents Page

General safety instructions

- *The positioner may only be assembled, started up or operated by trained and experienced personnel familiar with the product.*
  According to these mounting and operating instructions, trained personnel is referred to as individuals who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the relevant standards.
- *Explosion-protected versions of this positioner may only be operated by personnel who have undergone special training or instructions or who are authorized to work on explosion-protected devices in hazardous areas.*
  Refer to section 8 on Servicing explosion-protected versions.
- *Any hazards that could be caused by the process medium, the operating pressure, the signal pressure or by moving parts of the control valve are to be prevented by means of the appropriate measures.*
- *If inadmissible motions or forces are produced in the actuator as a result of the supply pressure level, it must be restricted by means of a suitable supply pressure reducing station.*
- *Proper shipping and appropriate storage are assumed.*

- ***Note!*** *The device with a CE marking fulfils the requirements of the Directives 94/9/EC (ATEX) and 89/336/EEC (EMC).*
  The declaration of conformity can be viewed and downloaded on the Internet at http://www.samson.de.

Positioner	
Nominal travel	Direct attachment to Type 3277: 3.75 to 30 mm Attachment acc. to IEC 60534-6: 5 to 200 mm
Nominal angle	Attachment acc. to VDI/VDE 3845 24° to 100°
Travel range	Adjustable within the rated travel/nominal angle
Reference variable w	Signal range 4 to 20 mA, split-range 4 to 11.9 mA and 12.1 to 20 mA, Static destruction limit 100 mA.
Minimum current	3.7 mA
Load impedance	≤ 6 V (corresponding to 300 Ω at 20 mA)
Supply air	Supply pressure from 1.4 to 6 bar (20 to 90 psi), Air quality acc. to ISO 8573-1: Max. particle size and density: Class 4 Oil content: Class 3, pressure dew point: Class 3 or at least 10 K beneath the lowest ambient temperature to be expected
Signal pressure (output)	0 bar up to supply pressure, limitable to approx. 2.4 bar via software
Characteristic	Selection: 1 characteristic for globe valves, 8 characteristics for opening angle
Hysteresis	≤ 1 %
Sensitivity	≤ 0.1 %
Transit time	< 0.5 s for initialization not permissible, adaptation over volume restriction Q
Direction of action	w/x reversible
Air consumption, st. state	Independent from supply pressure approx. 110 l_n/h
Air delivery Actuator pressurized Actuator vented	 At Δp =6 bar: ≥ 8.5 m_n^3/h, at Δp = 1.4 bar: 3.0 m_n^3/h $K_{Vmax(20\ °C)}$ = 0.09 at Δp =6 bar: ≤ 14.0 m_n^3/h, at Δp = 1.4 bar: 4.5 m_n^3/h $K_{Vmax(20\ °C)}$ = 0.15
Permissible ambient temperature	–20 to +80 °C, with metal cable gland –40 to +80 °C The limits specified in the EC Type Examination Certificate additionally apply for explosion-protected devices.
Influences	Temperature: ≤ 0.15 %/10 K Supply air: None Vibration: ≤ 0.25 % up to 2000 Hz and 4 g acc. to IEC 770
Electromagnetic compatibility	Complying with requirements specified in EN 61000-6-2, EN 61000-6-3 and NAMUR Recommendation NE 21
Explosion protection	Ex II 2 G EEx ia IIC T6 / II 2 D IP 65 T 80 °C or Ex II 3 G EEx nA/nL IIC T6 / II 3 D IP 65 T 80 °C
Degree of protection	IP 65
Materials	Die-cast aluminum GD AlSi12 acc. to DIN 1725 (3.2582), chromated and plastic coated; External parts: Stainless steel 1.4571 and 1.4301
Weight	Approx. 1 kg

Binary contacts	2 software limit switches with configurable limit values (0.5 % steps), with reverse polarity protection	
Signal status No response: Response:	**Without explosion protection** Conductive (R = 348 Ω) Non-conducting	**Explosion-protected version** ≥ 2.1 mA ≤ 1.2 mA
Operating voltage	For connection to binary input of the PLC acc. to EN 61131, P_{max} = 400 mW	Only for connection to NAMUR signal converter acc. to EN 60 957-5-6

1 Design and principle of operation

The electropneumatic positioner is mounted to pneumatic control valves and is used to assign the valve position (controlled variable x) to the control signal (reference variable w). The DC control signal received from a control unit is compared to the travel or rotational angle of the control valve and issues a signal pressure (output variable y).

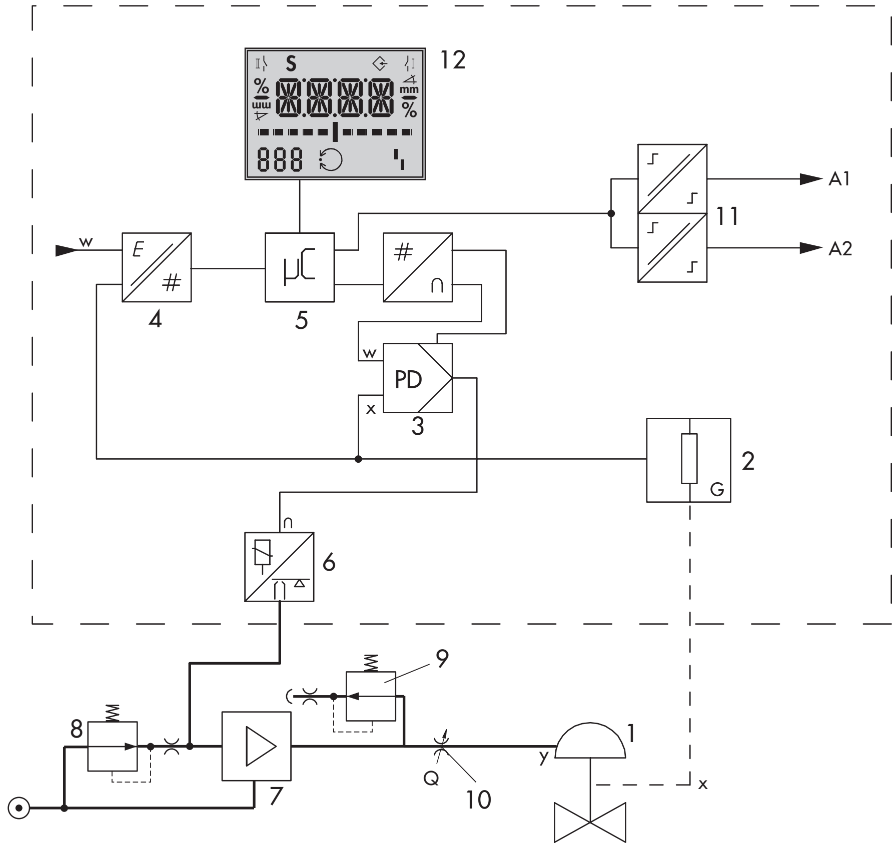
The positioner is designed depending on the corresponding accessories for direct attachment to Type 3277 Actuators or for attachment to actuators according to IEC 60534-6 (NAMUR).
Additionally, a coupling wheel included in the accessories is required to transfer the rotary motion for rotary actuators according to VDI/VDE 3845.

Springless rotary actuators require an accessory reversing amplifier to permit the powered operation in either direction.

The positioner basically consists of a travel sensor system that functions proportional to the resistance, an analog i/p module with downstream booster as well as the electronic unit with a microcontroller. The positioner is fitted with two adjustable software limit switches as standard to indicate the valve's end positions.

The position of the valve is transmitted as linear travel motion or angle of rotation via pick-up lever and travel sensor (2) to an analog PD controller (3). Simultaneously, an A/D converter (4) transmits the position of the valve to the microcontroller (5). The PD controller compares this actual position to the 4 to 20 mA DC control signal (reference variable) after it has been converted by the A/D converter (4).
In case of a system deviation, the operation of the i/p converter (6) is changed so that the actuator (1) is filled or vented via the downstream air capacity booster (7). This causes the closure member of the control valve to move to the position determined by the reference variable.
The pneumatic air capacity booster (7) and the pressure regulator (8) are provided with supply air. An intermediate flow regulator (9) with fixed settings is used to purge the positioner and also guarantees trouble-free operation of the pneumatic booster.
The output signal pressure supplied by the booster can be limited to 2.4 bar by activating the parameter P9.
The volume restriction Q (10) is used to optimize the positioner by adapting it to the actuator size.

Tight-closing function:
The pneumatic actuator is completely filled with air or vented as soon as the reference variable falls below 1 % or exceeds 99 % (see end positions set over parameters P10 and P11).



1 Control valve
2 Travel sensor
3 PD controller
4 A/D converter
5 Microcontroller
6 i/p converter
7 Air capacity booster
8 Pressure regulator
9 Flow regulator
10 Volume restriction
11 Limit switches
12 Display

Fig. 2 · Functional diagram

Positioner versions		-1 X
Explosion protection	Without	**0**
Applied for:	Ⓔx II 2 G EEx ia IIC T6 / II 2 D IP 65 T 80 °C acc. to ATEX	**1**
	Intrinsically safe CSA/FM (applied for)	**3**
	Ⓔx II 3 G EEx nA/nL II T6 / II 3 D IP 65 T 80 °C acc. to ATEX	**8**

2 Attachment to the control valve – mounting parts and accessories

The positioner can be attached either directly to a SAMSON Type 3277 Actuator or according to IEC 60534-6 (NAMUR) to control valves with cast yokes or rod-type yokes as well as to rotary actuators according to VDI/VDE 3845.

For attachment to the various actuators, corresponding mounting parts and accessories are required. These are listed with their order numbers in Tables 1 to 5.

On attaching the positioner, it is important to observe the assignment between lever and pin position according to the travels listed in the travel tables.
The travel that can be implemented at the valve is restricted by the pin position used and additionally by the actuator spring compression required.
The travel range listed in the travel tables can only achieved if the nominal range is set to MAX.
The positioner is standard equipped with the lever **M** (pin position **35**).

Note!
If the standard mounted lever M (pin position 35) is replaced, the newly mounted lever must be moved once all the way as far as it will go in both directions to adapt it to the internal measuring lever.

Travel table for direct attachment to Type 3277 Actuator

	Actuator size cm^2	Rated travel mm	Adjustment range at positioner Min.	Travel	Max.	Required lever	Assigned pin position
Type 3277-5 and 3277 Actuators	120	7.5	4.8		20	M	25
	120/240/350	15	6.8		35.4	M	35
	700	30	9.5		50	M	50

Travel table for attachment according to IEC 60534-6 (NAMUR)

SAMSON valves			Other valves/actuators			Required lever	Assigned pin position
	cm^2	Rated travel mm	Min.	Travel	Max.		
Type 3271 Actuator	60 and 120 with Type 3510 Valve	7.5	3.4		17.6	S	17
	120	7.5	4.8		25	M	25
	120/240/350	15	6.8		35.4	M	35
	700/1400/2800	15 and 30/30	9.5		50	M	50
	1400/2800	60	13.5		70.8	L	70
	1400/2800	60	19		100	L	100
	2800	120	38		200	XL	200
Rotary actuators			Opening angle 24° to 100°			M	90°

Table 1	Direct attachment to Type 3277-5 Actuator		Order no.
Mounting parts	For actuators with 120 cm^2 effective diaphragm area		1400-7452
Accessories for the actuator	Switchover plate (old) for Actuator Type 3277-5xxxxxx.**00** (old)		1400-6819
	Switchover plate **new** for Actuator Type 3277-5xxxxxx.**01** (new)		1400-6822
	Connecting plate for additional attachment of a solenoid valve G 1/8 Connecting plate (old) for Actuator Type 3277-5xxxxxx.**00** (old) 1/8 NPT		1400-6820 1400-6821
	Connecting plate **new** for Actuator Type 3277-5xxxxxx.**01** (new)		1400-6823
	***Note**: Only new switchover and connecting plates can be used with new actuators (Index 01). Old and new plates are not interchangeable.*		
Accessories for the positioner	Connecting plate (6)	G ¼: 1400-7461	¼ NPT: 1400-7462
	or pressure gauge bracket (7)	G ¼: 1400-7458	¼ NPT: 1400-7459
	Pressure gauge mounting kit (8) (output and supply)	Stainless steel/Brass: 1400-6950	Stainless steel/St. steel: 1400-6951
Table 2	Direct attachment to Type 3277 Actuator		
Accessories	Mounting parts for actuators with 240, 350 and 700 cm^2, see Fig. 4		1400-7453
	Required piping with screw fittings for "Actuator stem retracts" or when the top diaphragm chamber is filled with air	cm^2 Steel 240 1400-6444 350 1400-6446 700 1400-6448	Stainless steel 1400-6445 1400-6447 1400-6449
	Connection block with seals and screw	G ¼: 1400-8811	¼ NPT: 1400-8812
	Pressure gauge mounting kit (output and supply)	Stainless steel/Brass: 1400-6950	Stainl. steel/St. steel: 1400-6951

Table 3	Attachment to NAMUR ribs or control valves with rod-type yokes (rod diameter Ø 35 mm or smaller) according to IEC 60534-6, see Fig. 5		
Travel in mm	Lever	For actuators	Order no.
7.5	S	Type 3271-5 Actuator with 60/120 cm^2 on Type 3510 Valve, see Fig. 6	1400-7457
5 to 50	Without (lever M on basic model)	Actuators from other manufacturers and Type 3271 with 120 to 700 cm^2	1400-7454
14 to 100	L	Actuators from other manufacturers and Type 3271 with 1400 cm^2	1400-7455
40 to 200	XL	Actuators from other manufacturers and Type 3271 with 2800 cm^2, 120 mm travel	1400-7456
30 or 60	L	Type 3271 Actuator with 2800 cm^2 and 30 or 60 mm travel	1400-7466
Mounting brackets for Emerson and Masoneilan linear actuators In addition, a mounting kit acc. to IEC 60534-6 is required depending on the travel. See row above.			1400-6771
Accessories	Connecting plate	G ¼: 1400-7461 ¼ NPT: 1400-7462	
	or pressure gauge bracket (7)	G ¼: 1400-7458 ¼ NPT: 1400-7459	
	Pressure gauge mounting kit (output/supply)	St. steel/Brass: 1400-6950 St. steel/St. steel: 1400-6951	

Table 4	Attachment to rotary actuators (VDI/VDE 3845 for all sizes of fixing level 2) see Figs. 7 and 8		
Mounting parts	With follower clamp and coupling wheel	VDI/VDE 3845 for all sizes of fixing level 2 for Type 3278 Actuator with 160/320 cm^2 for Camflex II	1400-7448 1400-7614 1400-9120
Accessories	Connecting plate	G ¼: 1400-7461 ¼ NPT: 1400-7462	
	or pressure gauge bracket (7)	G ¼: 1400-7458 ¼ NPT: 1400-7459	
	Pressure gauge mounting kit (output/supply)	Stainless steel/Brass: 1400-6950 Stainless steel/Stainless steel: 1400-6951	

Table 5	General accessories		
Accessories	Pneumatic reversing amplifier for double-acting actuators	G ¼ ¼ NPT	1079-1118 1079-1119
	Cable gland M20 x 1.5	Nickel-plated brass	1890-4875
	Adapter M 20 x 1.5 to ½ NPT, aluminum		0310-2149
	Cover plate with list of parameters and operating instructions	German/English (standard) English/Spanish English/French	1190-7930 1190-8212 1190-8132

2.1 Direct attachment

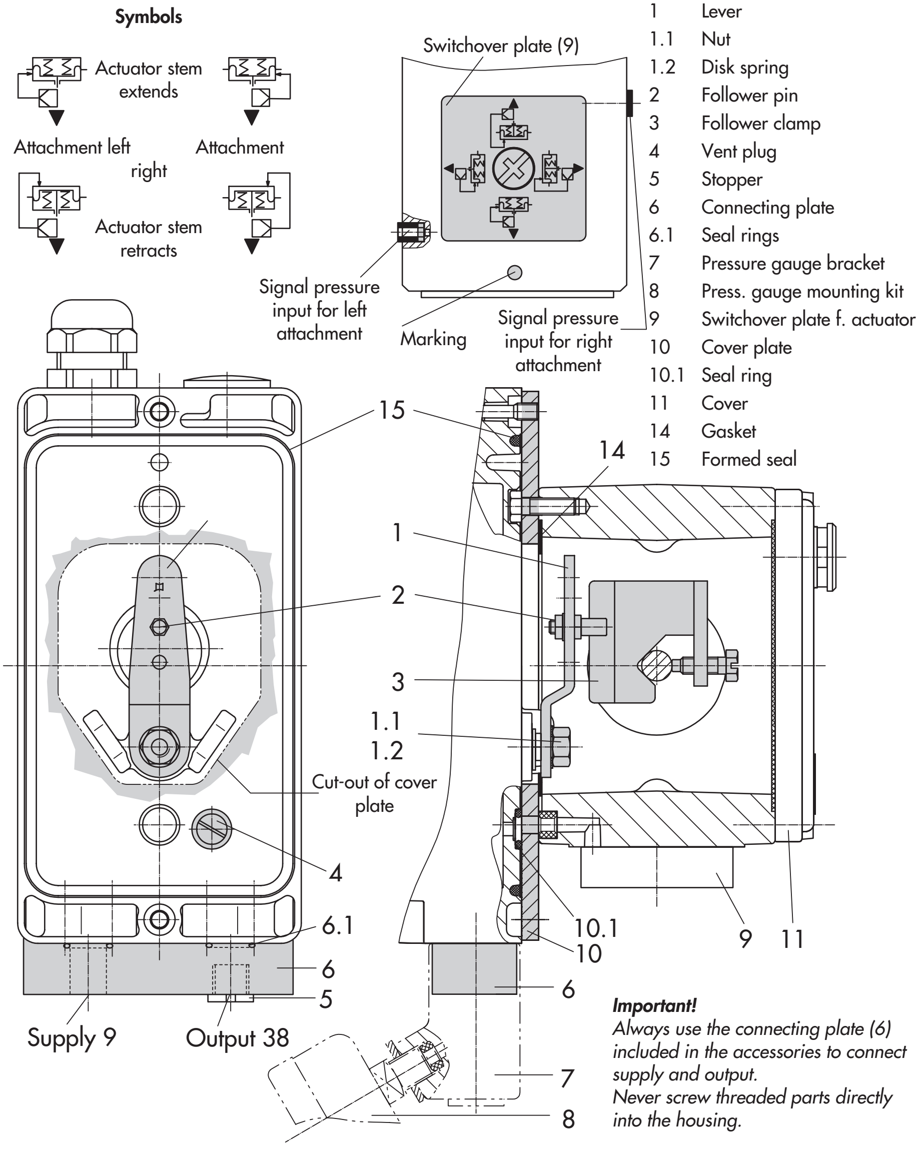
2.1.1 Type 3277-5 Actuator

Refer to Table 1 on page 10 for the required mounting parts as well as the accessories with their order numbers.
Note the travel table on page 9!

Actuator with 120 cm²

Depending on the type of positioner attachment, the signal pressure is routed either left or right of the yoke through a bore to the actuator diaphragm. Depending on the fail-safe action of the actuator "Actuator stem extends" or "Actuator stem retracts" (valve closes or opens if the supply air fails), the switchover plate (9) must first be attached to the actuator yoke. Align the switchover plate with the corresponding symbol for left or right attachment according to the marking (view looking onto the switchover plate).

1. Mount connecting plate (6) or pressure gauge bracket (7) with pressure gauges onto the positioner, making sure both seal rings (6.1) are seated properly.
2. Remove vent plug (4) on the back of the positioner and close the signal pressure output "Output 38" on the connecting plate (6) or on the pressure gauge bracket (7) with the stopper (5) included in the accessories.
3. Place follower clamp (3) on the actuator stem, align and screw tight so that the mounting screw is located in the groove of the actuator stem.
4. Mount cover plate (10) with narrow side of the cut-out opening (Fig. 3, on the left) pointing towards the signal pressure connection. Make sure that the bonded gasket (14) points towards the actuator yoke.
5. **15 mm travel:** Keep the follower pin (2) at lever **M** (1) on the back of the positioner in the pin position **35** (delivered state).
   7.5 mm travel: Remove the follower pin (2) from the pin position **35**, reposition it in the bore for pin position **25** and screw tight.
6. Insert formed seal (15) in the groove of the positioner casing.
7. Place positioner on the cover plate (10) in such a manner that the follower pin (2) rests on the top of the follower clamp (3). Adjust the lever (1) correspondingly and open the positioner cover to hold the positioner shaft in position at the cap or the switch (Fig. 11). The lever (1) must rest on the follower clamp with spring force. Mount the positioner on the cover plate (10) using the two fixing screws. During the installation make sure that the seal ring (10.1) is inserted in the bore of the intermediate plate.
8. Mount cover (11) on the other side. Make sure that the vent plug points downwards when the control valve is installed to allow any condensed water that collects to drain off.



Important!
Always use the connecting plate (6) included in the accessories to connect supply and output.
Never screw threaded parts directly into the housing.

Fig. 3 · Direct attachment – Signal pressure connection for Type 3277-5 Actuator with 120 cm²

2.1.2 Type 3277 Actuator

Refer to Table 1 on page 10 for the required mounting parts as well as the accessories with their order numbers.
Note the travel table on page 9!

Actuators with 240 to 700 cm^2

The positioner can be mounted either on the left or on the right side of the yoke. The signal pressure is routed to the actuator over the connection block (12), for actuators with fail-safe action "Actuator stem extends" internally through a bore in the valve yoke and for "Actuator stem retracts" through external piping.

1. Place follower clamp (3) on the actuator stem, align and screw tight so that the mounting screw is located in the groove of the actuator stem.
2. Mount cover plate (10) with narrow side of the cut-out opening (Fig. 4, on the left) pointing towards the signal pressure connection. Make sure that the bonded gasket (14) points towards the actuator yoke.
3. For actuators with 700 cm^2, remove the follower pin (2) at lever **M** (1) on the back of the positioner from pin position **35**, reposition it in the bore for pin position **50** and screw tight.
   For actuators 240 and 350 cm^2 with 15 mm travel, the follower pin (2) remains in pin position **35**.
4. Insert formed seal (15) in the groove of the positioner casing.
5. Place positioner on the cover plate in such a manner that the follower pin (2) rests on the top of the follower clamp (3). Adjust the lever (1) correspondingly and open the positioner cover to hold the positioner shaft in position at the cap or the switch (Fig. 11). The lever (1) must rest on the follower clamp with spring force. Mount the positioner on the cover plate (10) using the two fixing screws.
6. Make sure that the tip of the gasket (16) projecting from the side of the connection block (12) is positioned above the actuator symbol that corresponds with the actuator with fail-safe action "Actuator stem extends" or "Actuator stem retracts." If necessary, remove the three fixing screws and the cover. Then reposition the gasket (16) turned by 180°. The previous version of the connection block (Fig. 4, bottom) requires the switch plate (13) to be turned such that the corresponding actuator symbol points to the marking.
7. Place the connection block (12) with the associated seal rings against the positioner and the actuator yoke. Screw it tight using the fixing screw (12.1). For actuators with fail-safe action "Actuator stem retracts", additionally remove the stopper (12.2) and fit on the external signal pressure piping.
8. Mount cover (11) on the other side. Make sure that the vent plug points downwards when the control valve is installed to allow any condensed water that collects to drain off.

1 Lever
1.1 Nut
1.2 Disk spring
2 Follower pin
3 Follower clamp
10 Cover plate
11 Cover
12 Connection block
12.1 Screw
12.2 Stopper or connection for external piping
13 Switch plate
14 Gasket
15 Formed seal
16 Gasket

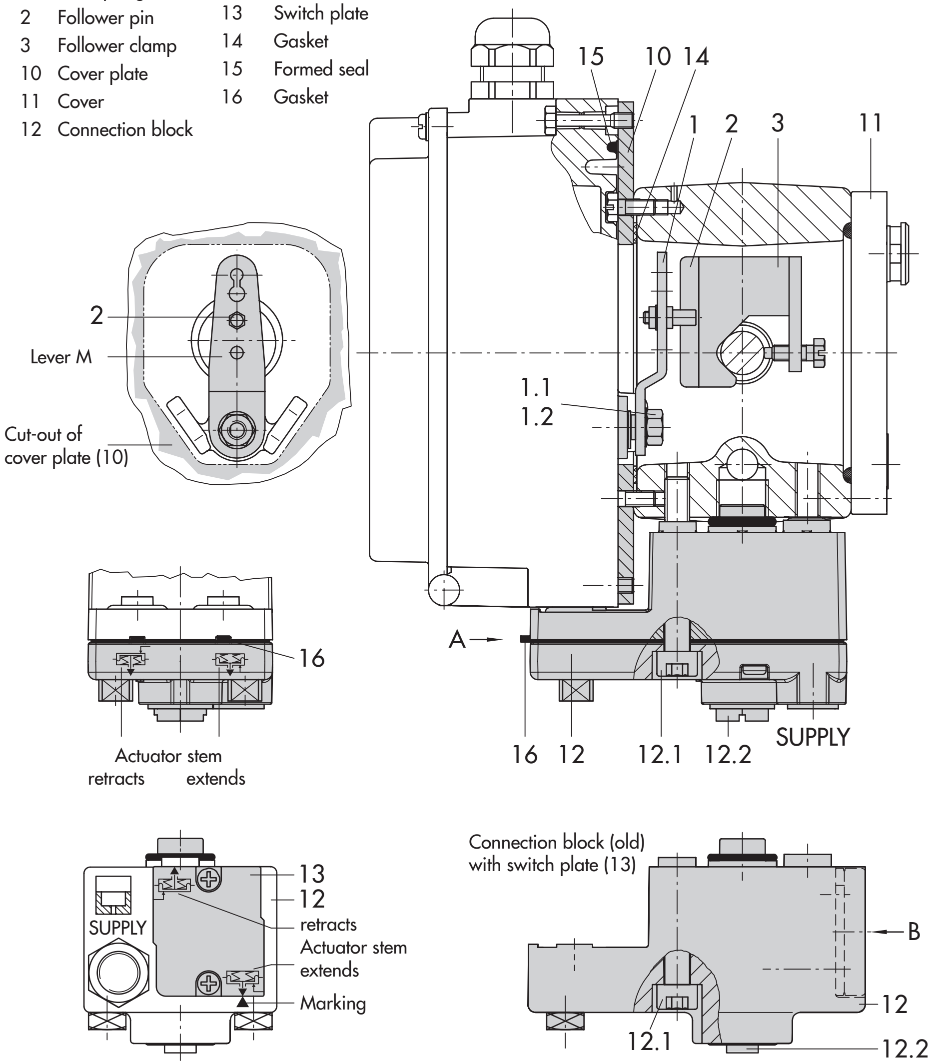


Fig. 4 · Direct attachment – Signal pressure connection for Type 3277 Actuator with 240, 350 and 700 cm²

2.2 Attachment according to IEC 60534-6

The positioner is attached to the control valve with a NAMUR bracket (10).

Refer to Table 3 on page 11 for the required mounting parts as well as the accessories with their order numbers.
Note the travel table on page 9!

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1. Screw the two bolts (14) to the bracket (9.1) of the stem connector (9), place the follower plate (3) on top and use the screws (14.1) to tighten.

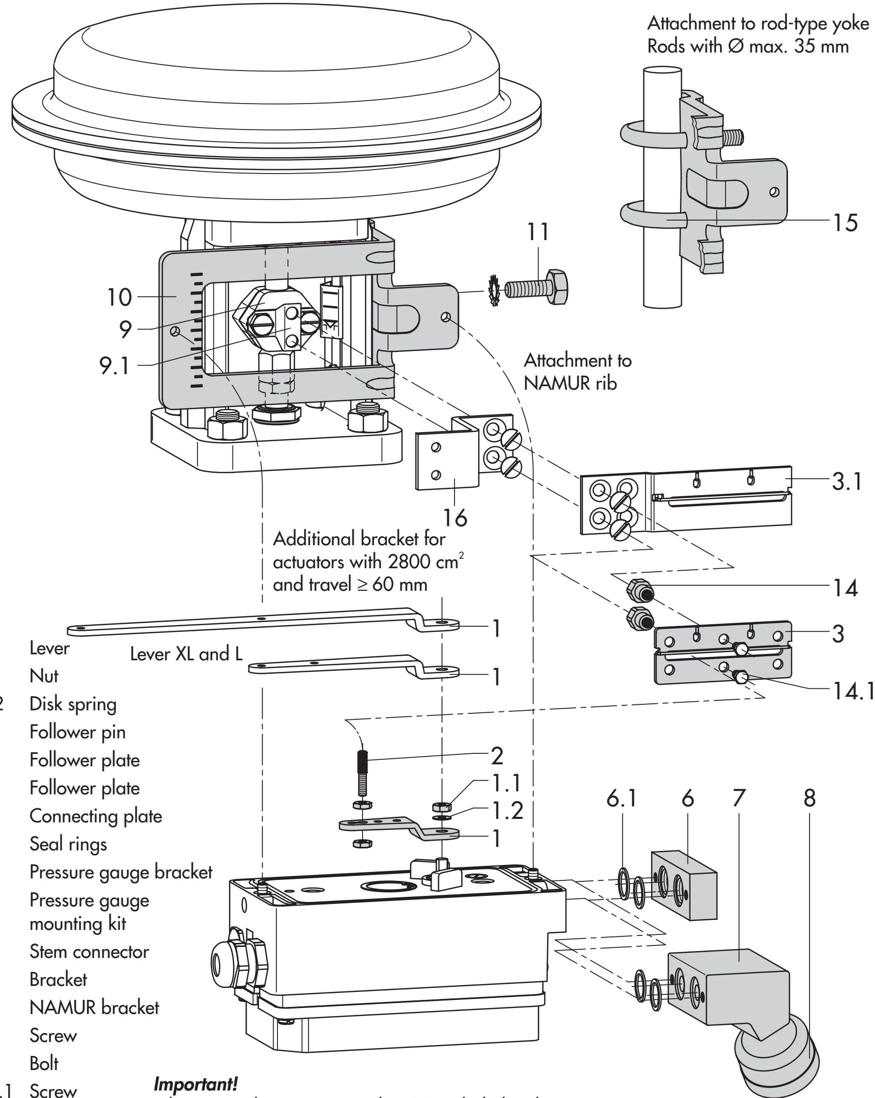
Actuator size 2800 cm²:
For a travel of 60 mm or smaller, screw the longer follower plate (3.1) directly to the stem connector (9). For a travel exceeding 60 mm, mount the bracket (16) first and then the follower plate (3) to the bracket together with the bolts (14) and screws (14.1).

2. Mount NAMUR bracket (10) to the control valve as follows:
   For attachment to the NAMUR rib, use an M8 screw (11) and toothed lock washer directly in the yoke bore.
   For attachment to valves with rod-type yokes, use two U-bolts (15) around the yoke.
   Align the NAMUR bracket (10) according to the embossed scale so that the slot of the follower plate (3) is centrally aligned with the NAMUR bracket at mid valve travel.
3. Mount connecting plate (6) or pressure gauge bracket (7) with pressure gauges (8) on the positioner, making sure both seal rings (6.1) are seated properly.
4. Select required lever size (1) **M**, **L** or **XL** and pin position according to the actuator size and valve travels listed in the table below.
   Should you require a pin position other than position **35** with the standard installed lever **M**, or require a lever size **L** or **XL**, proceed as follows:
5. Screw the follower pin (2) in the assigned lever bore (pin position) as listed in the table. Only use the longer follower pin (2) included in the mounting kit.
6. Place lever (1) on the positioner shaft and screw tight using the disk spring (1.2) and nut (1.1).

Note!
If you have mounted a new lever (1), you must move it once all the way as far as it will go in both directions.

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7. Place positioner on the NAMUR bracket in such a manner that the follower pin (2) rests in the slot of the follower plate (3, 3.1). Adjust the lever (1) correspondingly.
   Screw the positioner to the NAMUR bracket using both its fixing screws.



1 Lever
1.1 Nut
1.2 Disk spring
2 Follower pin
3 Follower plate
3.1 Follower plate
6 Connecting plate
6.1 Seal rings
7 Pressure gauge bracket
8 Pressure gauge mounting kit
9 Stem connector
9.1 Bracket
10 NAMUR bracket
11 Screw
14 Bolt
14.1 Screw
15 U-bolt
16 Bracket

Important!
Always use the connecting plate (6) included in the accessories to connect supply and output. Never screw threaded parts directly into the housing.

Fig. 5 · Attachment according to IEC 60534-6 (NAMUR)

2.3 Attachment to Type 3510 Micro-flow Valve

The positioner is attached to the valve yoke using a bracket.

Refer to Table 3 on page 11 for the required mounting parts as well as the accessories with their order numbers.
Note the travel table on page 9!

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1. Place clamp (3) on the valve stem connector, align at a right angle and screw tight.
2. Screw bracket (10) to the valve yoke using two screws (11).
3. Mount connecting plate (6) or pressure gauge bracket (7) with pressure gauges to the positioner, making sure both seal rings (6.1) are seated properly.
4. Unscrew the standard installed lever **M** (1) including follower pin (2) from the positioner shaft.
5. Take lever **S** (1) and screw follower pin (2) in the bore for pin position **17**.
6. Place lever **S** on the positioner shaft and screw tight using the disk spring (1.2) and nut (1.1).
   Move lever once all the way as far as it will go in both directions.
7. Place positioner on the bracket (10) in such a manner that the follower pin slides into the groove of the clamp (3).
   Adjust the lever (1) correspondingly.
   Screw the positioner to the bracket (10) using both its hexagon screws.

1 Lever
1.1 Nut
1.2 Disk spring
2 Follower pin
3 Clamp
6 Connecting clamp
6.1 Seal rings
7 Pressure gauge bracket
8 Pressure gauge mounting kit
10 Bracket
11 Screw

Important!
Always use the connecting plate (6) included in the accessories to connect supply and output.
Never screw threaded parts directly into the housing.

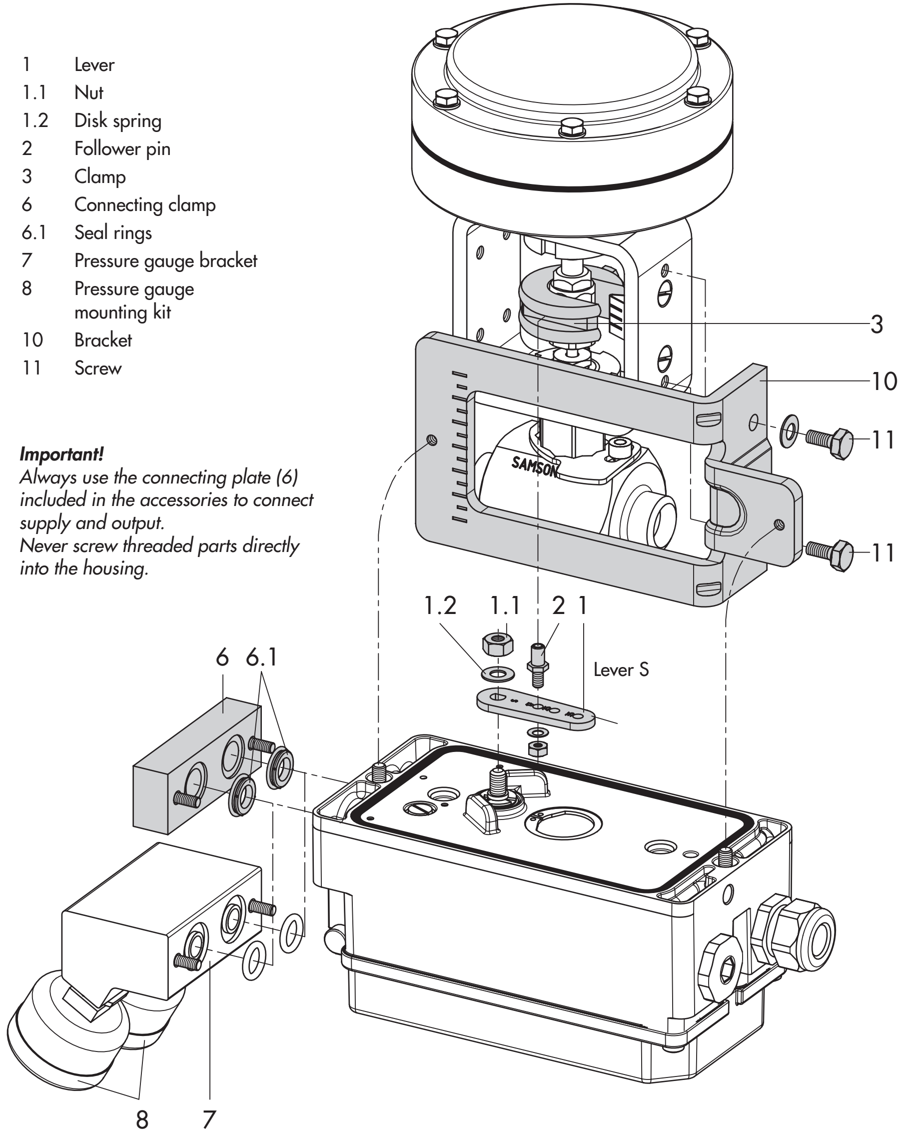


Fig. 6 · Attachment to Type 3510 Micro-flow Valve

2.4 Attachment to rotary actuators

The positioner is mounted to the rotary actuator using two pairs of double brackets.

Refer to Table 4 on page 11 for the required mounting parts as well as the accessories with their order numbers.

Prior mounting the positioner to the SAMSON Type 3278 Rotary Actuator, you have to mount the associated adapter (5) to the free end of the rotary actuator shaft.

Note!
During the installation of the positioner as described below, it is imperative that the actuator's direction of rotation be observed.

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1. Place follower clamp (3) on the slotted actuator shaft or the adapter (5).
2. Place coupling wheel (4) with flat side facing the actuator on the follower clamp (3). Refer to Fig. 8 to align slot so that it matches the direction of rotation when the valve is in its closed position.
3. Screw coupling wheel and follower clamp tightly onto the actuator shaft using the screw (4.1) and disk spring (4.2).
4. Screw the bottom pair of brackets (10.1) with the bends pointing either to the inside or to the outside (depending on the actuator size) to the actuator case. Position top pair of brackets (10) and screw tight.
5. Mount connecting plate (6) or pressure gauge bracket (7) with pressure gauges to the positioner, making sure both O-rings are seated properly.
   For **double-acting**, springless rotary actuators, a reversing amplifier is required to attach the positioner to the actuator, see section 2.5.
6. Unscrew the standard follower pin (2) from the positioner's lever **M** (1). Use the metal follower pin (Ø5) included in the accessories and screw tight into the bore for pin position **90**°.
7. Place positioner on the top pair of brackets (10) and screw tight. Considering the actuator's direction of rotation, adjust lever (1) so that it engages in the slot of the coupling wheel (4) with its follower pin (see Fig. 8). It must be guaranteed that the lever (1) is parallel to the long side of the positioner when the actuator is at half its angle of rotation.
8. Stick scale plate (4.3) on the coupling wheel so that the arrow tip indicates the closed position, and it can be easily read when the valve is installed.

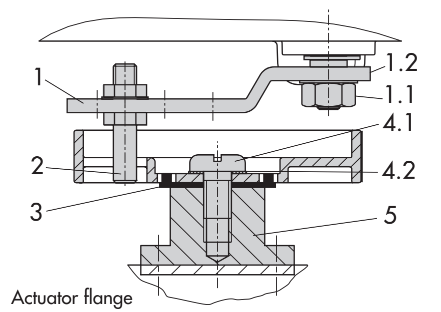
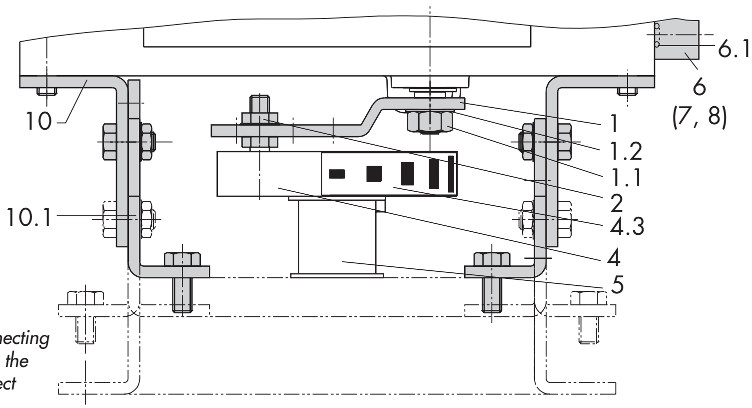
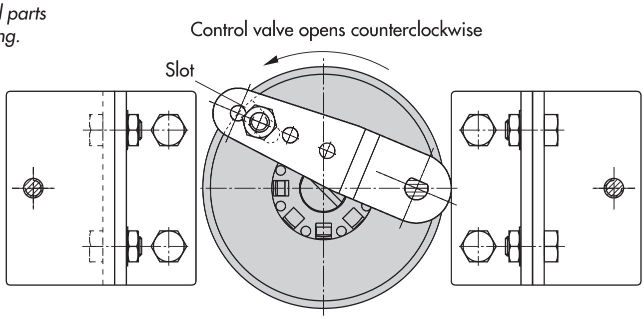


Fig. 7 · Mounting the coupling wheel with Type 3278



Important!
Always use the connecting plate (6) included in the accessories to connect supply and output.
Never screw threaded parts directly into the housing.



Legends Figs. 7 and 8

1 Lever
1.1 Nut
1.2 Disk spring
2 Follower pin
3 Follower clamp (Fig. 7)
4 Coupling wheel
4.1 Screw
4.2 Disk spring
4.3 Scale plate
5 Actuator shaft
Adapter for Type 3278
6.1 Seal rings
7 Pressure gauge bracket
8 Pressure gauge mounting kit
10 Top pair of brackets
10.1 Bottom pair of brackets

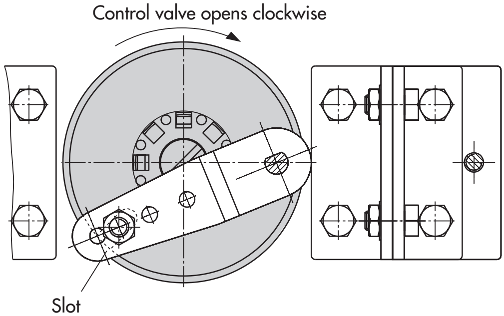


Fig. 8 · Attachment to rotary actuators

2.5 Reversing amplifier for double-acting actuators

For the use with double-acting actuators, the positioner must be fitted with a reversing amplifier. The reversing amplifier is listed as an accessory in the Table 5 on page 11.

The output signal pressure of the positioner is supplied at the output **A1** of the reversing amplifier. An opposing pressure, which equals the required supply pressure when added to the pressure at **A1**, is applied at output **A2**.
The rule **A1** + **A2** = **Z** applies.

Mounting

1. Mount the connecting plate (6) from the accessories in Table 4 to the positioner. Make sure that both O-rings (6.1) are seated correctly.
2. Thread the special nuts (1.3) from the accessories of the reversing amplifier into the boreholes of the connecting plate.
3. Insert the gasket (1.2) into the recess of the reversing amplifier and push both the special hollow screws (1.1) into the connecting boreholes **A1** and **Z**.
4. Place the reversing amplifier onto the connecting plate (6) and screw tight using both the special screws (1.1).
5. Use a screwdriver (8 mm wide) to screw the enclosed filters (1.6) into the connecting boreholes **A1** and **Z**.

Note!
The sealing plug (1.5) should not be unscrewed out of the reversing amplifier.
The rubber seal (1.4) is not required and can be removed when the sealing plug is used.

Signal pressure connections

A1: Output **A1** leading to the signal pressure connection at the actuator which opens the valve when the pressure increases

A2: Output **A2** leading to the signal pressure connection at the actuator which closes the valve when the pressure increases

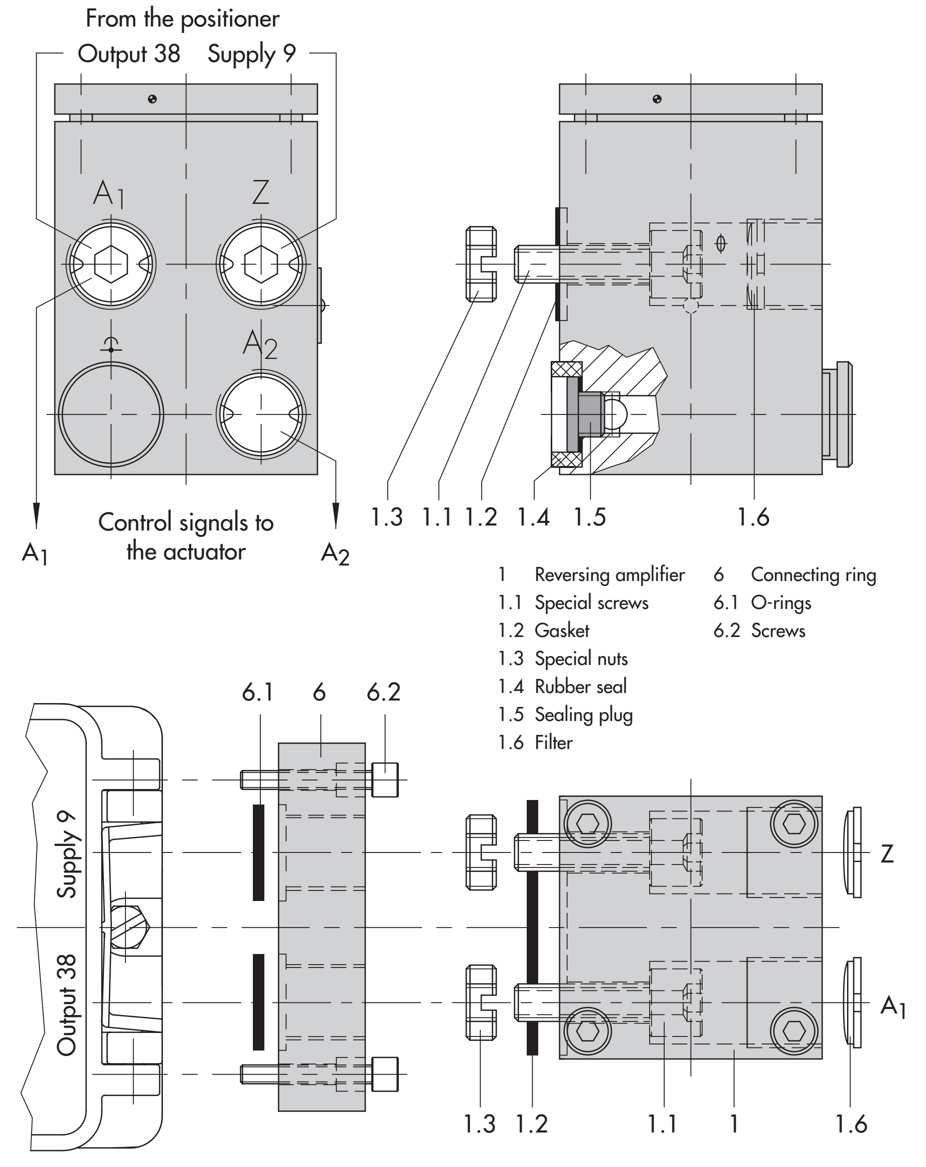


Fig. 9 · Mounting a reversing amplifier

3 Connections

3.1 Pneumatic connections

Caution!
The threads in the positioner housing are not designed for direct air connection!

The screw glands must be screwed into the connecting plate, the pressure gauge mounting block or the connection block from the accessories. The air connections are optionally designed as a bore with ¼ NPT or G ¼ thread.
The customary fittings for metal and copper pipes or plastic hoses can be used.

Note!
The supply air must be dry and free from oil and dust. The maintenance instructions for upstream pressure reducing stations must be observed.
Blow through all air tubes and hoses thoroughly prior to connecting them.

If the positioner is attached directly to the Type 3277 Actuator, the connection of the positioner's output pressure to the actuator is fixed. For attachment according to IEC 60534-6 (NAMUR), the signal pressure can be routed to either the top or bottom diaphragm chamber of the actuator, depending on the actuator's fail-safe action "Actuator stem extends" or "Actuator stem retracts".
For rotary actuators, the manufacturer's specifications for connection apply.

3.1.1 Signal pressure gauges

To monitor the supply air (Supply) and signal pressure (Output), we recommend that pressure gauges be attached (see accessories in Tables 1 to 5).

3.1.2 Supply pressure

The required supply air pressure depends on the bench range and the actuator's operating direction (fail-safe action). The bench range is registered on the nameplate either as spring range or signal pressure range. The direction of action is marked **FA** or **FE**, or by a symbol.

Actuator stem extends FA (Air to open ATO)

Fail-safe position "Valve Closed"
(for globe and angle valves):

Required supply pressure = Upper bench range value + 0.2 bar, minimum 1.4 bar.

Actuator stem retracts FE (Air to close ATC)

Fail-safe position "Valve Open"
(for globe and angle valves):
For tight-closing valves, the maximum signal pressure pst_{max} is roughly estimated as follows:

$$pst_{max} = F + \frac{d^2 \cdot \pi \cdot \Delta p}{4 \cdot A}$$

d = Seat diameter [cm]
Δp = Differential pressure across the valve [bar]
A = Actuator diaphragm area [cm^2]
F = Upper bench range of the actuator [bar]

If there are no specifications, calculate as follows:

Required supply pressure =
Upper bench range value + 1 bar

Note!
The signal pressure at the output (Output 38) of the positioner can be limited to approx. 2.4 bar by setting the parameter ***P9 = ON****.*

3.2 Electrical connections

For electrical installation, you are required to observe the relevant electrotechnical regulations and the accident prevention regulations that apply in the country of use. In Germany, these are the VDE regulations and the accident prevention regulations of the employers' liability insurance association.
The following standards apply for installation in hazardous areas:
EN 60079-14: 2003 (VDE 0165 Part 1) ***"Electrical apparatus for explosive gas atmospheres"*** *and*
EN 50281-1-2: 1999 (VDE 0165 Part 2) ***"Electrical apparatus for use in the presence of combustible dust"****.*
For the interconnection of intrinsically safe electrical equipment, the permissible maximum values specified in the EC type examination certificate apply (U_i or U_0; I_i or I_0; P_i or P_0; C_i or C_0, and L_i or L_0).
For EEx nA equipment (non-sparking apparatus), the standard EN 50021: 1999 specifies that connecting, interrupting, or switching circuits while energized is only allowed during installation, maintenance or repair work.
For EEx nL equipment (energy-limited apparatus), the standard EN 50021: 1999 allows this type of equipment to be switched under normal operating conditions.

Caution!
The terminal assignment specified in the certificate must be adhered to. Reversing the assignment of the electrical terminals may cause the explosion protection to become ineffective!
Do not tamper with enameled screws inside or on the housing.

Note on the selection of cables and wires:
To install intrinsically safe circuits, observe section 12 of the standard EN 60079-14: 2003 (VDE 0165 Part 1). To run multi-core cables or lines with more than one intrinsically safe circuit, section 12.2.2.7 of this standard applies.
An additional cable gland can be installed when connecting the device over two separate cables. Cable entries left unused must be sealed with blanking plugs. Devices used at ambient temperatures down to –40 °C must have metal cable entries.

The wires for the reference variable must be connected to the terminals 11 and 12 located in the housing. Only use **a current source**!

Caution!
The erroneous connection of a voltage source of just around 7 V (or around 2 V when connected to the wrong pole) can damage the positioner.

In general, it is not necessary to connect the positioner to a bonding conductor. Should this be required, however, this conductor can be connected inside the device.

For operation of the limit switches in Type 3730-11/-13/-18 Positioners, switching amplifiers which comply with EN 60947-5-6 must be connected to terminals 41/42 and 51/52 in the output circuit.
If the positioner is to be installed in hazardous areas, the relevant regulations must be observed.
Refer to Fig. 10 for the terminal assignment.

Note!
The minimum permissible reference variable should not fall below 3.7 mA.

Accessories:
Plastic cable gland M20 x 1.5:

Black	Order no. 1400-6985
Blue	Order no. 1400-6986
Nickel-plated brass	Order no. 1890-4875

Adapter M20 x 1.5 to ½ NPT
Aluminum, powder-coated
Order no. 0310-2149

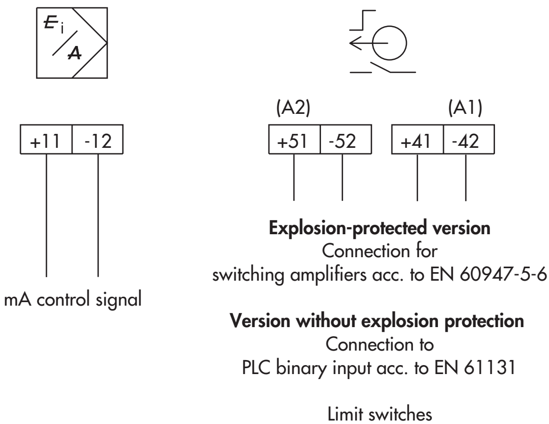


Fig. 10 · Electrical connections

4 Operation

The positioner is mainly operated with the rotary pushbutton.
The volume restriction must be set first to adapt the air delivery.

4.1 Operator controls

Rotary pushbutton

Turn the ⊛ button to select a parameter code (***P0*** to ***P16***) and then press it to confirm the parameter code selected.
If you want to change a parameter value, turn the ⊛ button to select the required valve. Then press the ⊛ button to confirm the value.

Note!
Parameter codes that have been changed are first saved in the EEPROM (protected against power failure) when the display returns to the status indication mode. Turn ⊛ *button to Code* ***P0*** *or wait three minutes until the display returns automatically.*
The parameter code is not saved permanently as long as the ⇨ *symbol appears at the top of the display.*

Note!
The positioner must be re-initialized after the parameter codes ***P2, P3, P4*** *and* ***P8*** *have been changed.*

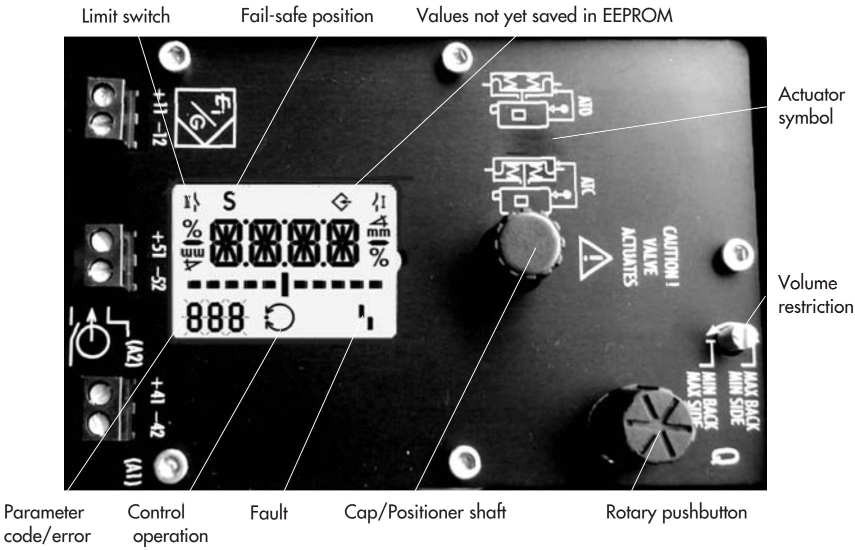


Fig. 11 · Operator controls and display

Volume restriction Q

The volume restriction is used to adapt the air delivery to the actuator size. Two fixed settings are possible depending on how the air is routed at the actuator. See section 5.1 for more details.

Display

The LC display indicates symbols that are assigned to codes and functions. The bar graph indicates the system deviation that depends on the sign (+/–) and the value. One bar graph element appears per 1 % system deviation.
If the positioner is not initialized, the lever position in degrees in relation to the longitudinal axis is indicated instead of the system deviation. One bar graph element corresponds to approximately a 5° angle.

If the ꜝı fault symbol appears on the display, turn the ⊛ button until ***ERR*** appears to view the error code(s) ***E0*** to ***E15***. Refer to section 5.6 for details.

5 Start-up

⚠ ***Warning!***
Do not perform a start-up while the process is running.
On applying supply air and the electric control signal, the control valve may move through its entire travel range/rotational angle range depending on the setting.

- Connect the supply air (Supply 9).
- Apply the electric reference variable 4 to 20 mA (terminals 11 and 12).

Note! *For most applications, the positioner is ready for operation with its default settings, provided it is attached properly.*
The positioner just needs to be initialized after the volume restriction has been set and the fail-safe position has been determined.

5.1 Setting the volume restriction Q

- For actuators smaller than 240 cm^2 with a loading pressure connection at the side (Type 3271-5), set restriction to MIN SIDE.
- For a connection at the back (Type 3277-5), set restriction to MIN BACK.
- For actuators 240 cm^2 and larger, set to MAX SIDE for a side connection and to MAX BACK for a connection at the back.

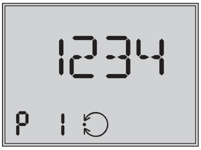
  Note! The positioner must re-initialized if the volume restriction setting is changed after the positioner has already been initialized.

5.2 Adapting the display

The data representation on the positioner display can be turned by 180°.
If the displayed data appear upside down, proceed as follows:

Turn the button until Code ***P1*** appears,

press button to confirm the selected code. ***P1*** blinks.

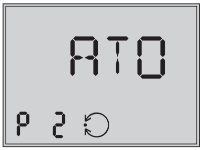


Reading direction for right attachment of pneumatic connections

Turn button until the display is adjusted to the desired direction, then confirm reading direction by pressing the button.

5.3 Determining the fail-safe position

Set the fail-safe position of the control valve over Code ***P2*** to **ATO** (Air to open) or ***ATC*** (Air to close).



Default *ATO*

Turn until Code ***P2*** appears.

Press to confirm ***P2***. ***P2*** blinks.

Turn until the required fail-safe position appears.
Press to confirm the setting.

5.4 Setting other parameters

The table below lists all the parameter codes and their default settings.
If you want to change the default setting of a parameter, proceed in the same manner as previously described.

More details concerning the parameter codes can be found in section 6.

Parameter codes	* The positioner must be re-initialized when the setting is changed		[...] Default setting
P0	Display with status indication	***P9***	Pressure limit 2.4 bar [OFF]
P1	Reading direction	***P10***	End position w < [ON]
P2 *	Fail-safe position [ATO] / ATC	***P11***	End position w > [OFF]
P3 *	Pin position [35]	***P12***	Limit value A1 switching threshold [2 %]
P4 *	Nominal range [MAX]	***P13***	Limit value A2 switching threshold [98 %]
P5	Characteristic [1]	***P14***	Display of reference variable w
P6	Reference variable [4...20 mA]	***P15***	INIT Start initialization
P7	w/x direction of action [>>]	***P16***	ZERO Start zero calibration
P8 *	Gain K_P [50]		

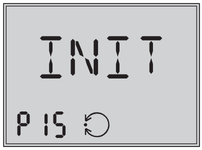
5.5 Initialization

During initialization the positioner adapts itself optimally to the friction conditions and the signal pressure demand of the control valve.
The type and extent of self-adaptation depends on the preset parameters.
MAX is the default setting for the nominal range (Code ***P4***). During the initialization process, the positioner determines the travel/rotational angle of the closing element from the CLOSED position as far as it will go in the other direction.

Note!
For standard operation, after the positioner is mounted on the valve and the volume restriction has been set and the fail-safe position has been checked over Code ***P2****, start initialization over Code* ***P15*** *to ensure the optimal functioning of the positioner.*
The positioner works with its standard settings (default settings).

Warning!
During the initialization, the control valve moves through its entire travel/angle of rotation range. Therefore, do not start initialization while a process is running, but only during start-up, when all shut-off valves are closed.

Start initialization by activating Code ***P15*** as follows:

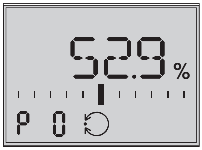


Turn until Code ***P15*** appears

Press button 6 seconds long,
6-5-4-3-2-1- is counted down on the display.

Initialization has started, the display blinks!

Note! *The time required for the initialization procedure depends on the actuator transit time and can take a few minutes.*



Initialization successfully completed, positioner runs in control operation

After a successful initialization, the positioner runs in control operation indicated by the control symbol and control position in % predetermined by the reference variable on the display.

A malfunctioning leads to the process being interrupted. The fault symbol appears on the display. See section 5.6 for details.

Canceling initialization

The initialization can be canceled by pressing . The positioner then moves to the fail-safe position (indicated by ***S*** on the display).

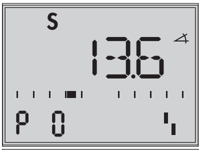
A new initialization can be started directly afterwards.

5.6 Faults

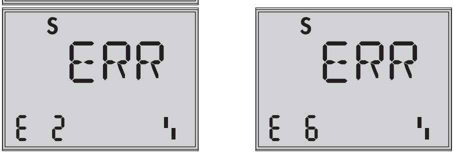
On the occurrence of a fault, the fault symbol appears at the bottom of the display.

By turning the button past Code ***P0*** or ***P16***, the respective error code ***E0*** to ***E15*** together with ***ERR*** appear on the display. Refer to the code list in section 6 for the cause of the errors and how to remedy them.

Example:
If, for instance, a travel has been entered over Code ***P4*** (nominal range) which is larger than the maximum valve travel possible, the initialization process would be interrupted (error code ***E2***) because the rated travel would not have been reached (error code ***E6***). The valve moves to the fail-safe position (***S*** indicated on the display).



Display of the fault indication



The nominal range (Code ***P4***) must be changed and the positioner re-initialized to remedy this problem.

Reset error codes

The error codes ***E0, E1, E8*** and ***E9*** can be reset as follows:



Turn button until the error code appears,

press button, ***ESC*** appears,

turn button, ***RST*** appears,

press button to reset error.

The resetting procedure can be canceled by pressing button when ***ESC*** appears.

Canceling the fail-safe position

The fail-safe position indicated by ***S*** on the display can be canceled over Code ***P0***.

When the status indication ***P0*** appears on the display:

Press , ***ESC*** appears,

turn , ***RST*** appears,

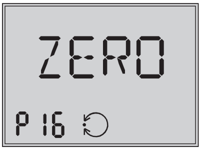
press to reset fail-safe position.

The positioner starts to run again with its original settings.

5.7 Zero calibration

In case of inconsistencies in the closing position of the valve, e.g. with soft-sealed plugs, it may necessary to recalibrate zero.

Start the zero calibration by activating Code ***P16*** as follows:



Turn button until Code ***P16*** appears.

Press button 6 seconds long,
6-5-4-3-2-1- is counted down on the display.

Zero calibration has started, the display blinks!

The positioner moves the control valve to the CLOSED position and recalibrates the internal electric zero point.

When the zero calibration has been successfully completed, the positioner returns to control operation (status indication).

Canceling zero calibration

The zero calibration can be canceled by pressing . The positioner then moves to the fail-safe position (indicated by ***S*** on the display).

A new zero calibration can be started directly afterwards.

6 Code list

Code	Display, values [default setting]	Description
Parameter codes	* The positioner must be re-initialized when the setting is changed	
P0		Status indication showing basic information. Canceling the fail-safe position with ***RST*** is possible.
P1	**Reading direction**	The reading direction of the display is turned by 180°.
P2 *	**ATO/ATC**	Parameter to adapt the positioner to how the control valve functions: ATO – Air to open (valve CLOSED in fail-safe position) ATC – Air to close (valve OPEN in fail-safe position)
P3 *	**Pin position** 17/25/[35]/50/70/ 100/200 mm/90°	The follower pin must be inserted into the correct pin position according to the valve travel/angle of rotation (select as per travel tables on page 9).
P4 *	**Nominal range** [MAX] Values with default setting [35]: e.g. 7.5/8.92/10.6/12.6/ 15.0/17.8/21.2 mm	The possible adjustment range can be selected in stages depending on the selected pin position ***17*** from 3.75 to 10.6 ***25*** from 5.3 to 15.0 ***35*** from 7.5 to 21.2 ***50*** from 10.6 to 30.0 ***70*** from 15.0 to 42.4 ***100*** from 21.2 to 60.0 ***200*** from 42.4 to 120 For ***90°*** Maximum range only, if *P3* = 90° ***MAX*** Maximum possible travel
P5	**Characteristic** 1 to 8 [1]	Characteristic selection: Characteristic 1 for globe valves, Characteristic 1 to 8 with rotary actuators (***P3*** = 90°) ***1***: Linear ***2***: Equal percentage ***3***: Rotary plug linear ***4***: Rotary plug eq. percentage ***5***: Butterfly valve linear ***6***: Butterfly valve eq. percentage ***7***: Segmented ball linear ***8***: Segmented ball eq. percentage
P6	**Reference variable** [4...20 mA] SRLO/SRHI	For split-range operation ***SRLO*** – low range 4 to 11.9 mA ***SRHI*** – high range 12.1 to 20 mA

P7	**w/x** >> /<> [>>]	Direction of action of the reference variable w to the travel/rotational angle x (increasing/increasing or increasing/decreasing).
P8 *	**Gain K_P** 30/[50]	On initializing the positioner, the gain is set to the selected value.
P9	**Pressure limit** ON/[OFF]	The signal pressure can take on the same pressure as the supply air at the maximum [***OFF***] or, in the case that the maximum actuator force can damage the valve, the pressure is limited to approx. 2.4 bar.
P10	**End position w <** [ON]/OFF	Tight-closing function: If w reaches up to 1 % towards the final value that causes the valve to close, the actuator is immediately completely vented (with ***ATO*** - Air to open) or filled with air (with ***ATC*** - Air to close). This action always lead to maximum tight-closing of the valve.
P11	**End position w >** ON/ [OFF]	Tight-closing function: If w reaches up to 99 % towards the final value that causes the valve to open, the actuator is immediately completely filled with air (with ***ATO*** - Air to open) or vented (with ***ATC*** - Air to close). This action always lead to the valve being completely opened.
P12	**Switching point A1** 0 to 100 % [2 %]	Software limit value A1 is displayed or can be changed in relation to the operating range (steps of 0.5 %).
P13	**Switching point A2** 0 to 100 % [98 %]	Software limit value A2 is displayed or can be changed in relation to the operating range (steps of 0.5 %).
P14	**Info w**	Display only, indicates the reference variable applied in 0 to 100 % corresponding 4 to 20 mA.
P15	**Start initialization**	The initialization process can be interrupted by pressing the rotary pushbutton. The control valve moves to its fail-safe position. Over parameter code ***P0***, the fail-safe position can be canceled again and the positioner then starts with the original setting. Also after a power supply failure, the positioner starts with its original setting.
P16	**Start zero calibration**	The zero calibration process can be interrupted by pressing the rotary pushbutton. The control valve moves to its fail-safe position. Over parameter code ***P0***, the fail-safe position can be canceled again and the positioner then starts with the original setting. Also after a power supply failure, the positioner starts with its original setting.

Error codes		
E0	**Zero error**	With tight-closing function ***P10*** w < set to ON Zero point incorrect. Error may arise when the mounting position/linkage of the positioner moves or when the valve seat trim is worn, especially with soft-sealed plugs.
	Remedy	Check valve and mounting of the positioner. If OK, perform a zero calibration over Code ***P16*** (see section 5.7) or select the error code and reset with ***RST***.
E1	**Displayed and INIT values are not identical**	Parameter codes were changed after the initialization had been completed.
	Remedy	Select the error code and reset with ***RST***.
E2	**Positioner has not been initialized**	
	Remedy	Set parameter and initialize the positioner over Code ***P15***.
E3	**K_P setting**	Positioner hunts. Volume restriction set incorrectly, too much gain.
	Remedy	Check the volume restriction setting as described in section 5.1. Limit gain K_P over Code ***P8***. Re-initialize the positioner.
E4	**Transit time is too fast**	The transit times of the actuator determined during initialization are so short (under 0.5 second) that the positioner cannot adapt itself well enough.
	Remedy	Check the volume restriction setting as described in section 5.1. Re-initialize the positioner.
E5	**Standstill detection is not possible**	Supply pressure is too low or varies. Mounting incorrect.
	Remedy	Check supply air and positioner mounting. Re-initialize the positioner.
E6	**Travel is not achieved**	Supply pressure is too low, actuator leaks, incorrect travel adjusted or pressure limit function activated.
	Remedy	Check supply air, positioner mounting and setting. Re-initialize the positioner.

E7	**Actuator does not move**	No supply air, mounting blocked. No input signal or input signal below 3.7 mA
	Remedy	Check supply air, positioner mounting and mA input signal. Re-initialize the positioner.
E8	**Travel signal at lower limit**	Wrong pin position, wrong lever, wrong attachment direction when NAMUR attachment is used.
	Remedy	Check positioner mounting and re-initialize the positioner.
E9	**Travel signal at upper limit**	Wrong pin position, wrong lever, wrong attachment direction when NAMUR attachment is used.
	Remedy	Check positioner mounting and re-initialize the positioner.
E10	Not assigned	
E11	**Hardware**	Defective ceramic oscillator, positioner continues to run with an internal RC oscillator, but it should be replaced as soon as possible.
	Remedy	Return positioner to SAMSON AG for repair.
E12	**No factory calibration**	No factory calibration performed, memory defective.
	Remedy	Return positioner to SAMSON AG for repair.
E13	**Memory fault**	Fault in the memory management
	Remedy	Return positioner to SAMSON AG for repair.
E14	**Checksum error data memory**	Data memory defective
	Remedy	Return positioner to SAMSON AG for repair.
E15	**Checksum error calibration data**	Data memory defective
	Remedy	Return positioner to SAMSON AG for repair.

7 Maintenance

The positioner does not require any maintenance.

There are filters with a 100 µm mesh size in the pneumatic connections for supply and output which can be removed and cleaned, if required.

The maintenance instructions of any upstream supply air pressure reducing stations must be observed.

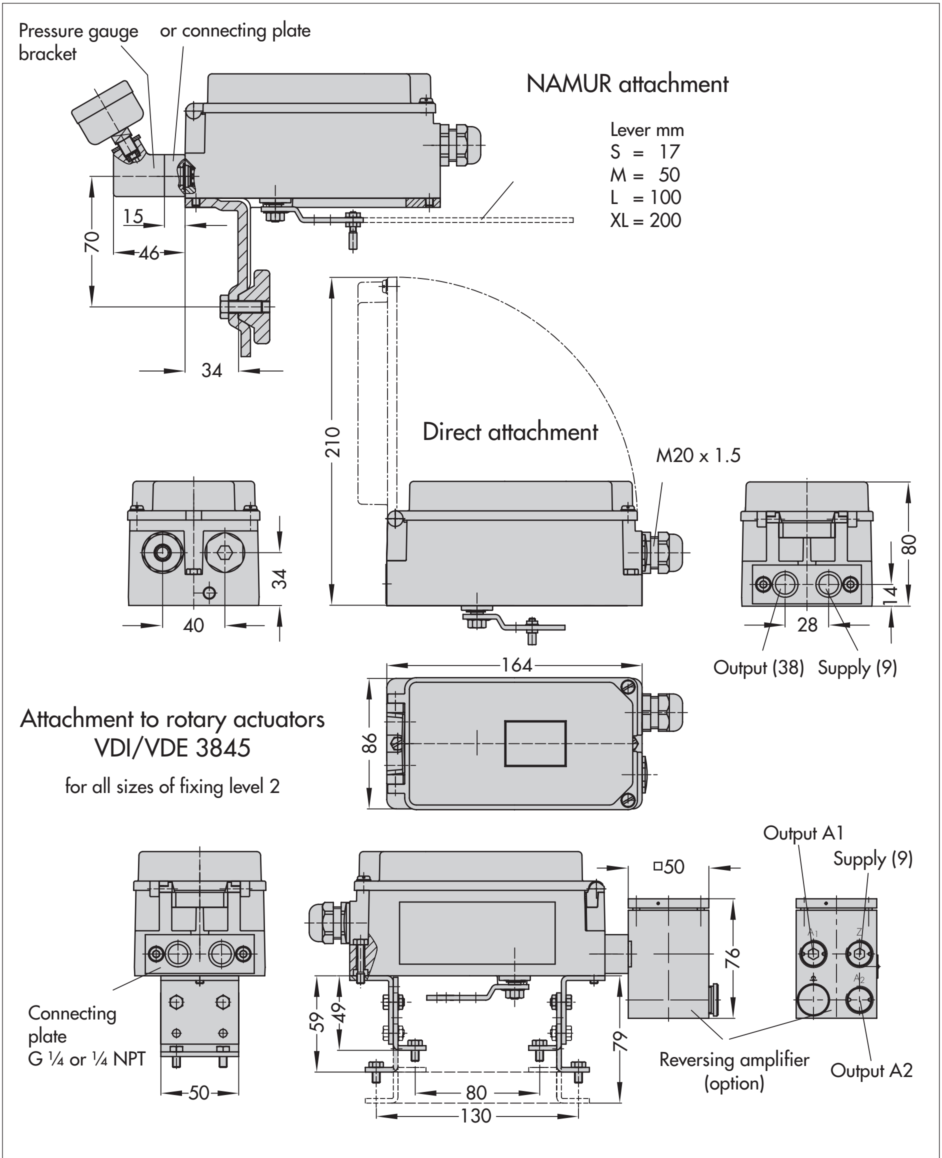
8 Servicing explosion-protected devices

If a part of the positioner on which the explosion protection is based needs to be serviced, the positioner must not be put back into operation until an expert has inspected the device according to explosion protection requirements, has issued a certificate stating this or given the device a mark of conformity.

Inspection by an expert is not required if the manufacturer performs a routine check on the device prior to putting it back into operation. The passing of the routine check must be documented by attaching a mark of conformity to the device.

Devices that have already been used outside of hazardous areas and are intended for use in hazardous areas in future must comply with the safety demands placed on repaired devices. Prior to operation, they must be tested according to the specifications stipulated for "Repairing explosion-protected devices".

9 Dimensions in mm



Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB

T R A N S L A T I O N

(1) **EC TYPE EXAMINATION CERTIFICATION**

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres – **Directive 94/9/EC**

(3) EC Type Examination Certificate Number

PTB 04 ATEX 2033

(4) Equipment: Model 3730-11... e/p Positioner

(5) Manufacturer: SAMSON AG Mess-und Regeltechnik

(6) Address: Weismüllerstr. 3, D-60314 Frankfurt, Germany

(7) The equipment and any acceptable variations thereof are specified in the schedule to this certificate.

(8) The Physikalisch-Technische Bundesanstalt, notified body number 0102 in according to Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres as specified in Annex II to the Directive.

The examination and test results are recorded in confidential report
PTB Ex 04-23506

(9) The Essential Health and Safety Requirements are satisfied by compliance with

EN 50014:1997+A1+A2 EN 50020:2002 EN 50281-1-1:1998

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB

(11) This EC Type Examination Certificate relates only to the design and examination of the specified equipment in compliance with Directive 94/9/EC Further requirements of this Directive apply to the manufacture and supply of this equipment. These requirements are not covered y this Certificate.

(12) The marking of the equipment shall include the following:

Ex **II 2G EEx ia IIC T6 and II 2D IP 65 T 80 °C**

Zertifizierungsstelle Explosionsschutz Braunschweig, 19 April 2004
By order

(Signature) (Seal)

Dr. Ing. U. Johannsmeyer

EC Type Examination Certificates without signature and seal are invalid.
This EC Type Examination Certificate may only be reproduced in its entirety and without any changes, schedule included.
Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt., Bundesallee 100, D-38116 Braunschweig
Ptb43-3730.doc

(13) **Schedule**

(14) **EC TYPE EXAMINATION CERTIFICATE No. PTB 04 ATEX 2033**

(15) **Description of Equipment**

The Model 3730-11... e/p Positioner is a single- or double-acting positioner for attachment to linear or rotary actuators.. It serves for translating control signal into valve stem positions.

The Model 3730-11... e/p Positioner is a passive two-terminal network which may be connected to any certified intrinsically safe circuit, provided the permissible maximum values of U_I, I_I and P_I are not exceeded.

For air supply non-combustible media are used.

The device is intended for use inside and outside of hazardous areas.

The correlation between temperature classification and permissible ambient temperature ranges are shown in the table below:

Temperature class	Permissible ambient temperature range
T6	-40 °C ... 55 °C
T5	-40 °C ... 70 °C
T4	-40 °C ... 80 °C

Electrical data

Signal circuit (terminals 11/12): Type of protection. Intrinsic safety EEx ia IIC only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 28 V
I_i = 115 mA
P_i = 1 W

C_i = 6 nF,
L_i = negligible

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Software limit switches (terminals 41/42 and 51/52): Type of protection. Intrinsic safety EEx ia IIC only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 20 V
I_i = 60 mA
P_i = 250 mW

C_i = 16 nF,

L_i = negligible

(16) Test Report: **PTB Ex 04-23506**

(17) Special conditions for safe use

None

(18) Special Health and Safety Requirements

Satisfied by compliance with the standards specified above

Zertifizierungsstelle Explosionsschutz
By order

Braunschweig, 19 April 2004

(Signature) (seal)

Dr. Ing. U. Johannsmeyer
Regierungsdirektor

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Braunschweig und Berlin

1. E R G Ä N Z U N G

gemäß Richtlinie 94/9/EG Anhang III Ziffer 6

zur EG-Baumusterprüfbescheinigung PTB 04 ATEX 2033

Gerät: e/p-Stellungsregler Typ 3730-11

Kennzeichnung: ⟨Ex⟩ **II 2 G EEx ia IIC T6 und II 2 D IP 65 T 80°C**

Hersteller: SAMSON AG Mess- und Regeltechnik

Anschrift: Weismüllerstr. 3, 60314 Frankfurt am Main, Deutschland

Beschreibung der Ergänzungen und Änderungen

Der e/p-Stellungsregler Typ 3730-11 wurde um eine LCD-Anzeige ergänzt. Die Layouts wurden modifiziert. Das Gerät darf künftig entsprechend den im Prüfbericht aufgeführten Prüfungsunterlagen gefertigt werden.

Die elektrischen Daten und alle übrigen Angaben der EG-Baumusterprüfbescheinigung gelten unverändert auch für diese 1. Ergänzung.

Prüfbericht: PTB Ex 05-24336

Zertifizierungsstelle Explosionsschutz
Im Auftrag

Braunschweig, 25. Januar 2005

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

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T R A N S L A T I O N

(1) **Statement of Conformity**

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres – **Directive 94/9/EC**

(3) EC Type Examination Certificate Number

PTB 04 ATEX 2114 X

(4) Equipment: Model 3730-18 e/p Positioner

(5) Manufacturer: SAMSON AG, Mess- und Regeltechnik

(6) Address: Weismüllerstr. 3, D-60314 Frankfurt, Germany

(7) The equipment and any acceptable variations thereof are specified in the schedule to this certificate and the documents referred to therein.

(8) The Physikalisch-Technische Bundesanstalt, notified body number 0102 in according to Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres as specified in Annex II to the Directive.

The examination and test results are recorded in confidential report PTB Ex 04-24289.

(9) The Essential Health and Safety Requirements are satisfied by compliance with

EN 50021:1999 EN 50281-1-1:1998

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use as specified in the schedule to this certificate.

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(11) In compliance with the Directive 94/9/EC this Statement of Conformity relates only to the design and construction of the equipment specified. Further requirements of this Directive apply to manufacture and marketing of the equipment.

(12) The marking of the equipment shall include the following:

Ex **II 3 G EEx nA II T6**	**or**	**II 3 G EEx nL IIC T6**
II 3 D IP 54 T 80 °C	**or**	**II 3 D IP 65 T 80 °C**

Zertifizierungsstelle Explosionsschutz
By order

Braunschweig, 09 Dezember 2004

(Signature) (Seal)

Dr. Ing. U. Johannsmeyer
Regierungsdirektor

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Braunschweig und Berlin

(13) **S c h e d u l e**

(14) **Statement of Conformity PTB 04 ATEX 2114 X**

(15) **Description of Equipment**

The Model 3730-18.. e/p Positioners is a single or double acting positioner serving for adjusting valve steam positions in compliance with an actuating signal.

The device is intended for use within hazardous locations.

The correlation between temperature classification and ambient temperature ranges is shown in the table below:

Temperature class	Permissible ambient temperature range
T6	-40 °C ... 55 °C
T5	-40 °C ... 70 °C
T4	-40 °C ... 80 °C

Electrical data

Signal circuit (terminals 11/12) — Type of protection EEx nA II or EEx nL IIC

Maximum values:

Ui = 28 V
Ii = 115 mA
Pi = 1 W

Ci = 6 nF
Li = negligible

Ui = 30 V
Ii = 100 mA
Pi = 1 W

Ci = 6 nF
Li = negligible

Physikalisch-Technische Bundesanstalt **PTB**
Braunschweig und Berlin

Software limit switches (terminals 41 / 42 and 51 / 52) — Type of protection EEx nA II or EEx nL IIC

Maximum values
Ui 20 V
Ii = 60 mA
Pi = 250 mW

Ci = 16 nF
Li = negligible

(16) Test Report: **PTB Ex 04 24289**

(17) Special conditions for safe use

If the signal circuit is to be connected to a circuit with type of protection EEx nA II, a series-connected fuse in compliance with IEC 60127-2/II, 250 V F or with IEC 60127-2/VI 250 V T with a maximum fuse nominal current $I_N \leq 80$ mA shall precede the signal circuit. The fuse shall be installed outside of the hazardous location.

If the signal circuit is to be connected to a circuit with type of protection EEx nL IIC, no series fuse need to be provided outside of the hazardous location.

The manufacturer shall ensure and furnish evidence that the enclosure of the Model 3730-18.. e/p Positioner including all cable entries, depending on the type of ventilation used, provides either degree of protection IP 54 or IP 65 in compliance with EN 60529. The cables shall be connected in such a manner that the connection facilities are not subjected to pull and/or twisting.

(18) Special Health and Safety Requirements

Are satisfied by compliance with the standards specified above

Zertifizierungsstelle Explosionsschutz — Braunschweig, 22 November 2004
By order

(Signature) (seal)

Dr. Ing. U. Johannsmeyer
Regierungsdirektor

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S/Z 2004-12